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Laparoscopic Management of Paratubal and Paraovarian Cysts

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ABSTRACT

Objectives: To define the proportion, methods of diagnosis, and a simplified laparoscopic technique for treating paratubal and paraovarian cysts.

Methods: We conducted a prospective cross-sectional study in the Gynecologic Endoscopy Unit of Assiut University Hospital in Assiut, Egypt in 1853 patients undergoing video-assisted laparoscopy. Transvaginal ultrasonography (TVS) was performed to detect paratubal or paraovarian cysts. Tubal shape and patency were evaluated with hysterosalpingography (HSG) in the infertile group. Diagnostic laparoscopy was performed to confirm the diagnosis of paratubal or paraovarian cysts. Small cysts were punctured and coagulated, and larger cysts required cystectomy and extraction of the cysts by using bipolar electrosurgery. Cystectomy was preceded by endocystic visualization in all cases. The primary outcomes measured included (1) correlation of the preoperative TVS, HSG, or both of these, with the laparoscopic diagnosis; (2) estimation of the success of the laparoscopic management of paratubal cysts; (3) assessment of the value of endocystic visualization prior to cystectomy; and (4) evaluation of tubal patency after laparoscopic management.

Results: Laparoscopically, only 118 patients (15.7%) were proved to have paratubal or paraovarian cysts. Preoperatively, TVS confirmed paratubal or paraovarian cysts in 52 (44%) patients. Cysts less than 3 cm in size (34 cases) were treated with simple puncture and bipolar coagulation of the cyst wall, whereas larger cysts (84 cases) were treated by cystectomy. Endocystic visualization using the 4-mm rigid hysteroscope was performed in 84 (71%) patients with large cysts. Statistically significant improvement occurred in tubal patency after laparoscopic management.

Conclusions: Sonographic diagnosis of not uncommon paratubal and paraovarian cysts is not always feasible and requires greater awareness and accuracy. The characteristic laparoscopic differentiation of ovarian cysts is the crossing of vessels over them. Endocystic-endoscopic visualization is a simple, valuable step prior to cystectomy. Bipolar coagulation or extraction of these cysts diagnosed at laparoscopy is easy, not time-consuming, and should be routinely performed in all cases following microsurgical laparoscopic principles.

Key Words: Paratubal cysts, Paraovarian cysts, Laparoscopy.

INTRODUCTION

Paratubal or paraovarian cysts represent approximately 10% of all adnexal masses.[1,2] They are usually derived from the mesothelial covering of the peritoneum or remnants of paramesonephric and mesonephric origin, so histologically they are covered by a single layer of ciliated columnar or flattened cells.[3] The concept of paramesonephric (müllerian) origin is supported by a report of 6 women with paraovarian cysts who were exposed prenatally to diethylstilbestrol (DES).[4] Morgagni's hydatid cysts are usually under 1 cm and found along the course of the fallopian tube, but paratubal cysts are seen in the broad ligament and may be larger in size.[5] However, other paraovarian cystic lesions have been reported, for example cystadenoma and adenofibroma,[6] lymphangioma diagnosed in 15 women,[7] ependymoma,[8] multicystic endosalpingiosis associated with tamoxifen therapy,[9] or cystic leiomyoma.[10] Malignant change has been reported in about 2% to 3%,[11] and it should be suspected if papillary projections are present.[12] Two cases of primary paraovarian serous cystadenocarcinoma have been reported in 2 postmenopausal women.[13] One case of transitional cell carcinoma that arose within a paratubal cyst has been clearly described.[14] The prevalence of paratubal or paraovarian cysts in a healthy population is not known due to the lack of data on healthy women.[12] This study aims to define the proportion, methods of diagnosis, and a simplified laparoscopic technique for treating paratubal and paraovarian cysts.

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PATIENTS AND METHODS

This study was conducted between July 1996 and December 2000 at the Endoscopic Unit of the Department of Obstetrics and Gynecology, Assiut University Hospital. It prospectively comprised 1853 patients who underwent video-assisted laparoscopy for different indications **(Table 1)**. Preoperative transvaginal ultrasonography (TVS) was performed as a routine examination in most patients. The ability to sonographically diagnose the paratubal or paraovarian cysts as a hypoechoic mass separate from the ovary was recorded **(Figure 1)**. Meticulous evaluation of hysterosalpingography (HSG) was made in infertile patients to identify tubal shape and patency. At laparoscopy, a thorough visualization of the mesosalpinx was achieved. If a cyst was seen between the ovary and the tube, it was called a "paraovarian cyst." The term "paratubal cyst" was used if the cyst was near the distal end of the tube. In all cases, observations were made about its size and site in relation to the ovary, evidence of associated Morgagni's hydatid cysts, and vasculature over the cyst. The principal diagnostic laparoscopic criteria were the location of the cyst and the crossing of the blood vessels over the cyst that made differentiation from ovarian cysts easy **(Figure 2)**. In all patients, tubal chromopertubation was used to assess tubal patency, and the relation of the cyst to the tubal lumen was recorded.

Operative treatment of these cysts varied according to cyst size. In cases of small cysts measuring less than 3 cm^3, simple cyst puncture was performed with a microneedle followed by the cyst's coagulation with a bipolar forceps. In cases of larger cysts, complete extraction was performed. Complete extraction started by making an antimesenteric linear incision over the cyst as far as possible from the tube by using microscissors or a microneedle with caution not to injure the cyst. Using a 5.5-mm trocar with its sleeve, a cyst puncture was performed followed by repeated suction irrigation. Meticulous endocystic visualization was achieved in all cases with a diagnostic hysteroscope loaded inside its diagnostic sheath as previously described[15] to ensure its benign nature. The cyst was then distended with warm saline. The 5.5-mm hole in the cyst wall was closed with a blunt grasping forceps with traction of the cyst upwards. Unlike ovarian cysts, paratubal and paraovarian cysts were easily dissected with another blunt grasping forceps within a shorter time. The cyst wall usually appeared thick and whitish and was easily extracted. Extraction of the entire cyst wall was usually followed by gentle coagulation of the bed with bipolar diathermy after proper identification of the ureter. Closure of the mesosalpingeal defect with coagulation of the edges with bipolar forceps was required. Sutures or monopolar diathermy were not used in any case to minimize the risk of peritubal adhesions or tubal damage. In all cases, histopathologic examination of the cyst was conducted. Copious peritoneal washing was done followed by leaving about 1 liter of lactated Ringer's solution intraperitoneally. All the laparoscopic findings were correlated

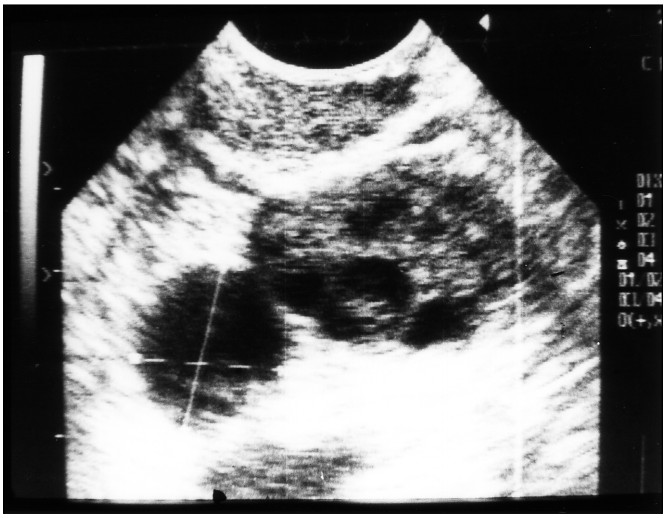

Figure 1. Sonographic diagnosis of paraovarian cysts.

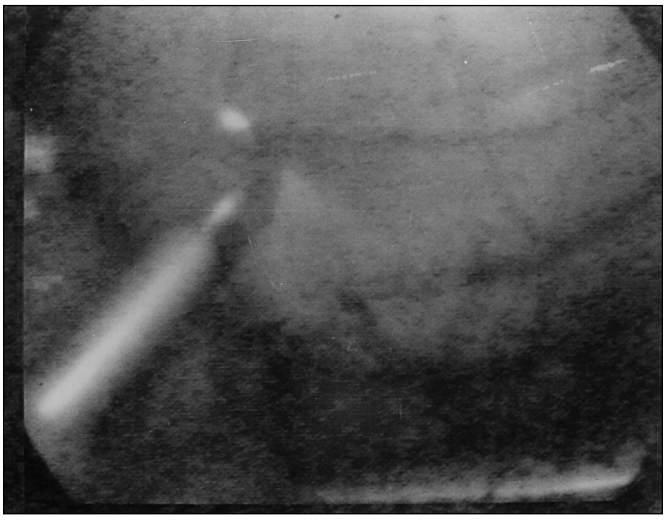

Figure 2. Laparoscopic appearance of paratubal cysts.

with the preoperative TVS findings. If pregnancy was not achieved within 3 months postoperatively, the patient underwent HSG performed with oily dye (lipiodol) to assess the state of the tube. Second look laparoscopy was done in some patients who did not conceive where proper evaluation of the pelvis after performing paratubal and paraovarian cystectomy was feasible. The χ^2 test was used to compare the study groups. For each comparison, $P>0.05$ was considered not significant, and $P\leq 0.05$ was considered significant.

RESULTS

This study included 1853 patients who underwent operative laparoscopy for different indications **(Table 1)**. Laparoscopically, only 118 patients (15.7%) were confirmed to have paratubal or paraovarian cysts. They were of childbearing age with a mean age of 34.2 years and mean parity of 2. Infertility was the salient complaint in 87 (74%) patients; however, pelvic pain was encountered in 27 (23%); and in the remaining 4, cysts (3%) were discovered accidentally during routine gynecologic examinations.

Table 1.
Indications for Video-Assisted Laparoscopy in 1853 Patients

Indication	n	%
Infertility workup	1590	85.6
Chronic pelvic pain	140	7.5
Ectopic pregnancy	85	4.5
Myomectomy	29	1.5
Oophorectomy	9	0.4

Preoperatively, TVS confirmed paratubal or paraovarian cysts in 52 (44%) patients as shown in **Table 2**. The sonographic appearance of the cysts in the majority of these 52 patients with paratubal or paraovarian cysts was anechoic thin-walled cystic masses in 46 patients (88%), whereas a solid nodule with an irregular wall was seen in only 1 case (1.9%). Thirty of the cysts (57%) were divided by thin septa.

Laparoscopically, the cysts were recorded as paratubal in 48 (40%) patients and paraovarian in 70 (60%). The cysts were unilateral in 80 (67.7%) patients, bilateral in 18 (15.3%), and more than 1 small cyst occurred on 1 side in the remaining 20 (17%). Endocystic visualization with the 4-mm rigid hysteroscope was performed in 84 (71%) patients with large cysts. It revealed unilocular cysts with smooth walls and thin vessels without solid areas in 53 (63%) patients. The cyst wall appeared thick in 20 (23.8%) patients. Solid nodules were seen in 6 of them. Bilocular cysts were seen in 7 (8%) patients. Proper endocystic visualization was not feasible in 4 (4.8%) patients. The mean duration of endocystic visualization was 8.5 minutes. **Table 3** demonstrates the endocystic and histopathologic diagnoses.

Tubal patency was assessed in the remaining 115 cases, which revealed free leakage of the dye in 67 (58%) patients, partial obstruction that was overcome by frequent injection of excessive amounts of the dye in 12 (10.5%) patients, and complete occlusion in the remaining 36 (31%) patients with kinking and stretching of the tube over the cyst. Postoperative tubal patency was assessed with HSG with oily dye in 76 (64.4%) patients and second-look laparoscopy was performed in 26 (22%) patients. In the remaining 16 patients (13.5%), tubal

Table 2.
Preoperative Sonographic Versus Laparoscopic Findings

Sonographic Findings	Laparoscopic Appearance		
	Paratubal Cyst	Ovarian Cyst	Morgagni's Hydatid Cyst
Paratubal or paraovarian cyst (62)	47 (75.8%)	10 (16.12%)	5 (8%)
Luteinized unruptured follicle (LUF) (17)	11 (64.7%)	5 (29.4%)	1 (5.8%)
Ovarian cyst (30)	9 (30%)	19 (63.3%)	2 (6.67%)
Not detected (9)	9 (100%)	0	0
Total	76 (64.4%)	34 (28.8%)	8 (6.78%)

$\chi^2=15.461$; $P=0.000$.

Table 3.
Endocystic Visualization Versus Histopathology

Endocystic Endoscopic Visualization	Histopathologic Findings			
	Mesothelioma	Cystadenoma	Endosalpingiosis	Inconclusive
Thin-walled unilocular cyst (53)	51 (96.2%)	0	0	2 (3.7%)
Thick-walled without solid nodules (20)	2 (10%)	16 (80%)	1 (5%)	1 (5%)
Thick-walled with solid nodules (6)	0	3 (50%)	3 (50%)	0
Multilocular cyst (7)	6 (85.7%)	1 (14.28%)	0	0
Inconclusive (4)	4 (100%)	0	0	0

χ^2 =8.549; *P*=0.02.

patency was not feasible because of patients being lost to follow-up (6 cases) or patients' refusal to undergo either procedure (10 patients). **Table 4** shows statistically highly significant improvement in tubal patency after laparoscopic management. Cysts less than 3 cm in size (34 cases) were treated with simple puncture and bipolar coagulation of the cyst wall, whereas larger cysts (84 cases) were treated by cystectomy. The mean cyst size was 6.5 cm, and the largest cyst treated laparoscopically in this series was 13 cm in diameter. Laparoscopic management was feasible in all cases without intraoperative or postoperative complications. Three cases of ectopic pregnancy were associated with paratubal cysts of small size (less than 3 cm), which were treated concomitantly. Other simultaneous laparoscopic procedures are shown in **Table 5**. Clinical and sonographic follow-up of the treated patients revealed no recurrence of the cyst in any patient within at least 6 months postoperatively.

Table 4.
Tubal Patency Before and After Laparoscopic Management

	Before Operation	After Operation
Patent	67 (58%)	95 (80.5%)
Partial obstruction	12 (10.5%)	0
Total obstruction	36 (31%)	7 (5.9%)
Not known	3 (2.5%)	16 (13.5%)

χ^2=9.436; *P*=0.000.

Table 5.
Concomitant Laparoscopic Procedures In 118 Patients*

Operative Laparoscopic Procedures	n (%)
PCO drilling	72 (61)
Salpingotomy	3 (2.6)
Oophorectomy	9 (7.6)
Adhesiolysis	31 (26.3)
Cystectomy	10 (8.5)
Myomectomy	29 (24.6)
LUNA	10 (8.5)

*More than 1 procedure was required in 46 cases.

DISCUSSION

Paratubal or paraovarian cysts were laparoscopically diagnosed in 118 patients (15.7%) in our series. This proportion demonstrates that they are not uncommon and should be kept in mind during routine transvaginal ultrasonography or during laparoscopy. Most paratubal and paraovarian cysts are asymptomatic and accidentally discovered, but they may occasionally give rise to clinical problems due to enlargement or torsion. In a study[16] of 338 young patients with a clinical picture of acute appendicitis, 44 had acute appendicitis plus a coincidental paratubal cyst, and 2 additional cases of torsion of huge paratubal cysts (13.6%) were detected. In our series, pelvic pain, whether acute or chronic, was diagnosed in 27 patients (22.8%). Only 3 cases (2.5%) were associated with ectopic tubal pregnancy, which was seen just distal to the site of the paratubal cysts. The exact implication of the presence of paratubal cysts in the causation of ectopic pregnancy is not clear,[17] but it may be explained by disturbed tubal motility, compression of the already

narrow tubal lumen, or defective vascularization of the fallopian tubes. Diagnosis of these cases with pelvic pain highlights the value of removal or coagulation of every paratubal or paraovarian cyst discovered at laparoscopy to achieve free tubal motility in the next pregnancies. The presence of paraovarian cysts may mislead the sonographer during ovulation monitoring. Moreover, cyst removal may eliminate the possibility of torsion or other complications. The significant effect of paratubal cystectomy on tubal patency supports the concept of routine removal of any paratubal or paraovarian cyst discovered at laparoscopy. An additional value of removal of these cysts detected at laparoscopy is the exclusion of the rare possibility of malignancy (2% to 3%) and obtaining sufficient tissues for histopathologic evaluation. Lastly, its extraction is relatively easy and less time-consuming, unlike that with ovarian cystectomy.

Sonographically, such cysts are usually thin-walled, simple,[12] and persistent on follow-up.[5] The diagnosis depends on identifying the ipsilateral ovary separate from it.[12,18] Sonographic diagnosis, however, is not always feasible in all cases. In 1 study, in only 1 of 15 patients with paraovarian or paratubal cysts was the presence of the cyst suggested before surgery.[2] Ultrasonography missed a paratubal cyst as large as 4 cm in another study.[19] In our study, paratubal cysts were diagnosed in only 44% of our patients. This can be explained by failure to visualize the ipsilateral ovary separately from the cyst particularly when the cyst was relatively large or multilocular. Proper delineation of the ovary can be easily achieved by injection of a sterile saline into the peritoneal cavity via a plastic catheter during sonohysterography particularly in infertile patients, as a preliminary step in the diagnostic workup to screen the genital tract. The advantages of this procedure have been clearly described.[20]

Laparoscopic differentiation of paratubal and paraovarian cysts from ovarian cysts is usually easy via laparoscopy. However, in some cases with dense pelvic adhesions, endometriosis, a fallopian tube stretched over the cyst, or huge cysts, the characteristic laparoscopic finding noticed in all cases was the crossing of blood vessels over the surface of the cyst. Different laparoscopic modalities have been used to extract or destroy paratubal or paraovarian cysts. We used bipolar electrosurgery due to its well-known advantages over monopolar diathermy.[21] Moreover, the proximity of these cysts to the fallopian tubes and the ureter makes bipolar diathermy safer with minimal postoperative adhesion formation. This concept is supported by the highly significant effect of our procedure on tubal patency. Radiofrequency current was used to destroy the cyst wall or to extract it completely in 17 patients with paraovarian cysts in a previous study.[22] However, the authors reported ultrasonographic recurrence in 7 patients (6.6%) that required laparotomy. In our study, no single case of recurrence was noticed on follow-up for at least 6 months postoperatively.

Despite being rare, the diagnosis of malignant paratubal or paraovarian cysts is crucial. Transvaginal Doppler ultrasonography was used for this purpose. The authors reported high pulsatility and resistive indices in benign cases. However, they consider their work preliminary requiring further investigation.[23] In the medical literature, this is the first time endocystic visualization of paratubal or paraovarian cysts has been reported. It is a relatively quick, simple step aimed at ensuring the benign nature of the cyst. If the cyst wall appears smooth without solid nodules, the surgeon has the option of coagulating it or excising it. On the other hand, a suspicion of malignancy makes complete excision highly indicated with immediate frozen section evaluation, and possible laparotomy. Other advantages of this simple procedure have been demonstrated in a previous study on cystic ovarian tumors.[15]

From this study, we conclude that paratubal or paraovarian cysts are not uncommonly diagnosed. Sonographic diagnosis of these cysts is not always feasible, and diagnosis requires greater awareness and accuracy. The characteristic laparoscopic differentiation of ovarian cysts is the crossing of vessels over them. Endocystic-endoscopic visualization is a simple, valuable step prior to cystectomy. Bipolar coagulation or extraction of these cysts diagnosed at laparoscopy is easy, not time-consuming, and should be routinely performed in all cases following basic laparoscopic microsurgical principles.

References:

1. Azzena A, Quintieri F, Salmaso R. A voluminous paraovarian cyst. Case report. *Clin Exp Obstet Gynecol*. 1994;21(4):249-252.

2. Barloon TJ, Brown BP, Abu-Yousef MM, Warnock NG. Paraovarian and paratubal cysts: preoperative diagnosis using transabdominal and transvaginal sonography. *J Clin Ultrasound*. 1996;24(3):117-122.

3. Athey PA, Cooper NB. Sonographic features of paraovarian

cysts. *AJR*. 1985;144:83-86.

4. Haney AF, Newbold PR, Fetter BF, McLachlan JA. Paraovarian cysts associated with prenatal diethylstilbestrol exposure. Comparison of the human with a mouse model. *Am J Pathol*. 1986;124(3):405-411.

5. Occhipinti KA. Computed tomography and magnetic resonance imaging of the ovary. In: Anderson JC, ed. *Gynecologic Endoscopy*. London: Churchill Livingstone; 1999:347-349.

6. Korbin CD, Brown DL, Welch WR. Paraovarian cystadenomas and cystadenofibromas: sonographic characteristics in 14 cases. *Radiology*. 1998;208(2):459-462.

7. Pellicano M, Iorio F, Fortunato N. Increase of paraovarian cysts. Differential diagnosis, macroscopic and microscopic aspects and role of laparoscopy. *Minerva Ginecol*. 1994;46(11): 597-600.

8. Guerrieri C, Jarlsfelt I. Ependymoma of the ovary. A case report with immunohistochemical, ultrastructural, and DNA cytometric findings, as well as histogenetic considerations. *Am J Surg Pathol*. 1993;17(6):623-632.

9. McCluggage WG, Weir PE. Paraovarian cystic endosalpingiosis in association with tamoxifen therapy. *J Clin Pathol*. 2000;53(2):161-162.

10. Carabias E, Lopez-Pino MA, Dhimes FP, Vargas J. Paratubal cystic leiomyoma: radiologic and pathologic analyses. *Eur J Radiol*. 1995;20(1):28-31.

11. Stein AL, Koonings PP, Schlaerth JB, Grimes DA, d'Ablaing G 3rd. Relative frequency of malignant paraovarian tumors: should paraovarian tumors be aspirated? *Obstet Gynecol*. 1990;75:1029-1031.

12. Tailor A, Hacket E, Bourne T. Ultrasonography of the ovary. In: Anderson JC, ed. *Gynecologic Endoscopy*. London: Churchill Livingstone; 1999:334-349.

13. Kim JS, Woo SK, Suh SJ, Morettin LB. Sonographic diagnosis of paraovarian cysts: value of detecting a separate ipsilateral ovary. *AMJ*. 1995;164(6):1441-1444.

14. Altras MM, Jaffe R, Corduba M, Holtzinger M, Bahary C. Primary paraovarian cystadenocarcinoma: clinical and management aspects and literature review. *Gynecol Oncol*. 1990;38(2): 268-272.

15. Thomason RW, Rush W, Dave H. Transitional cell carcinoma arising within a paratubal cyst: report of a case. *Int J Gynecol Pathol*. 1995:14(3):270-273.

16. Darwish AM, Amin AF, El-Feky MA. Ovarioscopy, a Technique to Determine the Nature of Cystic Ovarian Tumors. *J Am Assoc Gynecol Laparosc*. 2000;7(4):539-544.

17. Vlahakis-Miliaras E, Miliaras D, Koutsoumis G, Miliaras S, Spyridakis I, Papadopoulos MS. Paratubal cysts in young females as an incidental finding in laparotomies performed for right lower quadrant abdominal pain. *Pediatr Surg Int*. 1998;13(2-3):141-142.

18. Jones HW III. Tumors of the tube, parovarium and uterine ligaments. In: Jones HW III, Wentz AC, Burnett LS, eds. *Novak's Textbook of Gynecology*. 11th ed. Baltimore: Williams & Wilkins; 1988:778-789.

19. Fleischer AC, McKee MS, Gordon AN, et al. Transvaginal sonography of postmenopausal ovaries with pathologic correlation. *J Ultrasound Med*. 1990:9(11):637-644.

20. Darwish AM, Youssef AA. Screening sonohysterography in infertility. *Gynecol Obstet Invest*. 1999:48(1):43-47.

21. Nezhat C, Siegler A, Nezhat F, Nezhat C, Seidman D, Luciano A, eds. Electrosurgery. In: *Operative Gynecologic Laparoscopy: Principles and Techniques*. 2nd ed. New York: McGraw-Hill Co Inc; 2000:73-82.

22. Chamah M, Ochoa JG, Martinez G, Medina O, Castaneda A. Laparoscopic management of ovarian and paraovarian masses using radiofrequency. *J Am Assoc Gynecol Laparosc*. 1996:3(4, Suppl):S7.

23. Hamper UM, Sheth S, Abbas FM, Rosenshein NB, Aronson D, Kurman RJ. Transvaginal color Doppler sonography of adnexal masses: differences in blood flow impedance in benign and malignant lesions. *AJR*. 1993:160(6):1225-1228.

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